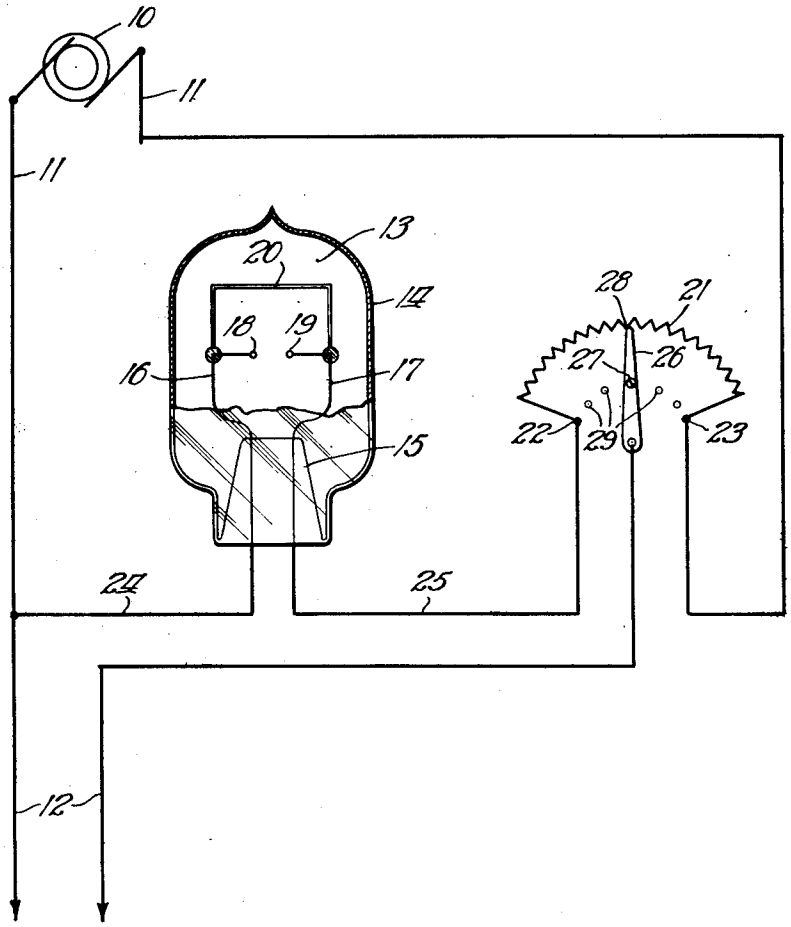
Nov. 12, 1929. N. C. WARD 1,735,820

STABILIZER

Filed Feb. 20, 1928



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By Isabel & Banning Attys.

Patented Nov. 12, 1929 1,735,820

UNITED STATES PATENT OFFICE

NEIL C. WARD, OF CHICAGO, ILLINOIS

STABILIZER

Application filed February 20, 1928. Serial No. 255,809.

My invention relates to stabilizers, and more particularly to such devices which are used to maintain a substantially constant potential even though the source from which it is taken varies within more or less wide limits.

My invention is of use in connection with direct, alternating, pulsating, or similar currents.

In one application of my invention, it is used to supply a substantially constant potential to the various current consuming instrumentalities of a radio receiving set. Radio receiving sets are being increasingly operated from alternating current or similar sources, as such currents are supplied over commercial circuits. The voltages of these commercial circuits, however, are not sufficiently constant for the purposes of satisfactory operation of such radio receiving sets.

My invention in one form of its application, when interposed between the source of current supply and the radio receiving set, serves to eliminate the changes in potential and delivers to the radio receiving set a current at constant potential.

My invention, of course, has many other uses besides the one form of application hereinbefore referred to.

In accordance with my invention, I utilize a device having a negative resistance characteristic. One form of such device is an arc whose drooping characteristic shows that, as the current flowing by way of the arc increases, the pressure or voltage across the terminals of the arc decreases. There are other devices having a negative resistance characteristic which are equally available in connection with my invention, such, for instance, as the Nernst lamp glower. In accordance with my invention, I utilize such a device in connection with other translating means, which, in the preferred embodiment, may take the form of a plain resistance arranged as a potentiometer. I will describe such form of my invention more in detail by referring to the accompanying drawing illustrating the same.

In the drawing, I show a source of alternating current potential 10 which is illustrative of the generator at the central station supplying current through the distributing mains 11. The potential as furnished by means of these aims may vary at times between ninety volts and one hundred and thirty volts. It is the function of my device to supply a steady voltage to the output circuit conductors 12, 12 which form what I may call the output circuit, the mains 11, 11 forming the input circuit.

My improved device consists, in the form shown, of an enclosed tungsten arc operating in a suitable inert gas, such, for instance, as neon. This device is indicated at 13 and consists of the enclosing tube 14 having the reentrant stem 15 sealed therein. The atmosphere within the tube, as before stated, preferably consists of neon, the air and other deleterious gases having been previously withdrawn in so far as that may be necessary and possible. Two leading-in conductors 16 and 17, sealed into the stem, extend outwardly and form the terminals of the device. Within the device, these leading-in conductors 16 and 17 rigidly support two arcing terminals 18 and 19. Although forming no part of my invention, the leading-in conductors terminate at their upper extremity in a rod 20, which, due to its expansion, maintains the proper separation between the terminals 18 and 19 irrespective of the expansion of said terminals 18 and 19 due to the heat occasioned upon operation of the device. Such a device has a negative resistance characteristic, that is, the voltage drop across the terminals 18 and 19 decreases as the current flowing across these terminals 18 and 19 increases.

In the embodiment of the invention shown, this negative resistance device is connected in series with a potentiometer 21, which consists of a plain resistance having the terminals 22 and 23. The circuit through the device thus may be traced from the generator 10, the main 11, the conductor 24, the negative resistance device 13, conductor 25, potentiometer 21 and main 11, back to the generator 10. The output circuit is then connected by means of one of the conductors 12 to the conductor 24, and the other conductor 12 is connected to

an adjustable arm 26, which arm is adapted to make contact with any particular point along the potentiometer 21. The arm 26 is provided with a set screw 27, which may, of course, be replaced by any other suitable device for the purpose of locking said arm 26 in its adjusted position.

It is of course not necessary that a potentiometer or resistance be used in series with the translating device having a negative resistance characteristic since some other means such as an impedance or choke coil may be used instead of the resistance shown, particularly with alternating current.

The operation of my device will now be understood. If we assume, for instance, that a current of .35 of an ampere traverses the space between the terminals 18 and 19, then the arc voltage may, in a given case, be approximately ninety-seven volts. If, on the other hand, a current of one ampere traverses the space between the terminals 18 and 19, then the arc voltage in such case may be approximately forty-five volts. It will thus be apparent that the remainder of the total drop across the mains 11 must then be taken up by the potentiometer, in this case, as a resistance loss. This means that as the drop across the terminals 18 and 19 decreases, the drop between the points 22 and 23 increases. If now a point such for instance as the point 28, is selected to which one of the conductors 12 of the output circuit is connected, then such point, if properly chosen, will be the one by virtue of which the voltage across the conductors 12 remains constant. As a general rule, if the device is used in connection with a given radio set, merely an initial adjustment is required, whereupon the arm 26 may be fastened in its adjusted position. In order to make this adjustment, it is, of course, necessary to move the arm 26 from point to point in order to ascertain the particular place 28 at which it should be finally fastened. I find that if, for instance, the arm 26 is moved in a contraclockwise direction from the particular point 28 which corresponds to the particular output circuit, the output voltage varies inversely with the input voltage; and I find that if the arm 26 is moved clockwise beyond the point 28, then the output voltage varies with the input voltage. This, therefore, gives a very simple method of arriving at the proper position which the arm 26 should occupy.

The device can, of course, be calibrated for certain output loads, so as to eliminate the necessity of test and experiment, and for this reason I have provided a plurality of holes, such as the holes 29, which in co-operation with the set screw 27 form the resting positions of the arm 26 in accordance with predetermined output loads.

From what has thus been described, it is thought the nature of my invention will be readily clear to those skilled in the art, and it will also be clear that many modifications may be made without departing from its spirit.

Having, however, thus described one specific form thereof, what I claim as new and desire to secure by Letters Patent is:

1. Means for stabilizing electrical potentials or the like comprising, a circuit including a resistance and a device having a negative resistance characteristic adapted for attachment to a source of current, and means whereby an output circuit may be electrically associated with said first aforesaid circuit in a manner to include a part of said resistance.

2. Means for stabilizing electrical potentials or the like comprising, a circuit including a resistance and a device having a variable resistance characteristic adapted for attachment to a source of current, and means whereby an output circuit may be electrically associated with said first aforesaid circuit in a manner to include a part of said resistance.

3. Apparatus of the class described comprising two translating devices adapted for connection with a source of current supply, one of said devices having a negative resistance characteristic, and means for electrically associating an output circuit with said devices in a manner to include a conducting portion of the second device.

4. Apparatus of the class described comprising a circuit adapted for connection with a source of current supply, said circuit including a translating device having a negative resistance characteristic and additional translating means, and means for electrically associating an output circuit with said first aforesaid circuit in such manner as to include a portion of said additional translating means.

5. Means for abstracting a source of substantially constant potential from a source of variable potential which consist of a plurality of translating devices included in circuit, one of said devices having a resistance characteristic such that the potential across said device decreases as the current increases.

6. Means for stabilizing electrical potentials or the like comprising a circuit including a resistance and a device having a negative resistance characteristic adapted for connection to a source of current and means for connecting an output circuit with said first aforesaid circuit to exclude a part of said resistance, said means being adjustable to vary the amount of resistance excluded from said output circuit.

7. Means for stabilizing electrical potentials or the like comprising a circuit including a resistance and a device having a negative resistance characteristic adapted for connection to a source of current and means for connecting an output circuit with said first aforesaid circuit to exclude a part of said

resistance, said means including a contact member movable relative to said resistance to contact therewith at any one of a plurality of positions and means for locking said member in one of said positions.

8. Means for supplying a substantially constant potential from a source of variable potential to an output circuit, comprising a device having a negative resistance characteristic and a resistance adapted to be connected in series across said source of variable potential and means for connecting said output circuit in parallel with said device and a portion of said resistance whereby the potential drop across the terminals of said output circuit remains substantially constant regardless of the variations in said source of variable potential.

9. Means for supplying a substantially constant potential from a source of variable potential to an output circuit, comprising a device having a negative resistance characteristic and a resistance adapted to be connected in series across said source of variable potential and means for connecting said output circuit in parallel with said device and a portion of said resistance whereby the potential drop across the terminals of said output circuit remains substantially constant regardless of the variations in said source of variable potential said means including adjusting means for changing the amount of resistance in parallel with said output circuit.

In witness whereof, I hereunto subscribe my name this 14th day of February, A. D., 1928.

NEIL C. WARD.